

# PERCEPÇÕES SOBRE O EVOLUCIONISMO TEÍSTA EM UMA AMOSTRA REGIONAL NO BRASIL: INFLUÊNCIAS RELIGIOSAS E EDUCACIONAIS

## *PERCEPTIONS OF THEISTIC EVOLUTION AMONG A REGIONAL SAMPLE IN BRAZIL: RELIGIOUS AND EDUCATIONAL INFLUENCES*

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### Resumo

**Introdução:** o ensino da teoria evolutiva é crucial para o desenvolvimento da cultura científica, pois complementa o conhecimento sobre genética, ecologia e medicina. **Objetivos:** este estudo investiga as percepções do público sobre a aceitação do evolucionismo teísta em uma amostra regional no Brasil, considerando a religião e o nível de escolaridade como variáveis. **Metodologia:** um questionário estruturado foi aplicado a 390 respondentes, e testes estatísticos foram conduzidos para analisar a significância das diferenças observadas. **Resultados:** os resultados indicam que os respondentes teístas apresentaram maior tendência a concordar com o evolucionismo teísta, enquanto aqueles com níveis mais altos de escolaridade mostraram uma maior propensão ao desacordo. No entanto, as diferenças encontradas entre os níveis de escolaridade não foram estatisticamente significativas. **Conclusões:** esses achados ressaltam a necessidade de pesquisas adicionais sobre como os antecedentes religiosos e educacionais influenciam a compreensão pública da teoria da evolução.

**Palavras-chave:** Evolução teísta; Criacionismo; Evolução biológica.

### Abstract

**Introduction:** teaching evolutionary theory is crucial to the development of scientific culture, as it complements knowledge of genetics, ecology, and medicine. **Objectives:** then, this study investigates public views on the acceptance of theistic evolution in a

regional sample in Brazil, considering religion and education level as variables. **Methodology:** a structured questionnaire was applied to 390 respondents, and statistical tests were conducted to analyze the significance of the observed differences. **Results:** results indicate that theistic respondents were more likely to agree with theistic evolution, while respondents with higher education levels showed a greater tendency to disagree. However, the differences found between education levels were not statistically significant. **Conclusions:** these findings highlight the need for further research on how religious and educational backgrounds shape public understanding of evolutionary theory.

**Keywords:** Theistic evolution; Creationism; Biological evolution.

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## **1. Introduction**

Biological evolution is one of the foundational concepts in biology and serves as the unifying framework for understanding biodiversity and the history of life. Its teaching is crucial for developing scientific literacy, as it provides insights into genetics, ecology, and medicine. However, the acceptance of evolutionary theory is often influenced by religious and cultural factors, leading to varying degrees of resistance, particularly in countries with strong religious traditions, such as Brazil.

Biological evolution and creationism present different perspectives on how the history of life on Earth unfolded. Discussions involving these conceptions are particularly present in the United States, where there is a large presence of creationist groups, mostly evangelicals, who reject the theory of evolution and

take a radical stance against the evidence that supports evolutionary theory<sup>1</sup>. This dogmatism is also present among the defenders of biological evolution. A classic example is the atheistic scientist Richard Dawkins<sup>2</sup> who bluntly criticizes those who believe in the existence of God or of any form of religiosity and defends the idea that the evolutionary process is the only explanation for the diversity of species.

Although more present in the United States, conflicts between evolutionists and creationists also occur in Latin America, especially in Brazil<sup>3</sup>. Brazil is officially a secular state. Even though the law that prohibits Church interference in the public sphere of the State, as stipulated in the Federal Constitution, it is not always contemplated. It is possible to observe strong religious influences in Brazilian politics and society<sup>4,5</sup>. Several

studies discuss the teaching of biological evolution in Brazil and show of the pervasiveness of misconceptions due to the influence of teachers' religious beliefs, as well as to distorted opinions and understandings of students about the Darwin theory<sup>6-8</sup>.

Creationists believe that the world and living beings were created by a supernatural agent<sup>9</sup>. According Rocha<sup>10</sup>, creationism should no longer be known as a single, literal hypothesis taken from the book of Genesis (Earth and unchangeable species created by God) as there are different biblical interpretations that gave rise to various creationist groups. Authors such as Numbers<sup>11</sup> and Scott<sup>12</sup> give their own definitions of various types of creationism. In this article, the creationist definitions presented will be based on the broader typology proposed by Engler<sup>9</sup>.

According to the model proposed by Engler<sup>9</sup>, creationism can be divided into nine categories. The first of these, called Young Earth, interprets the Bible literally and considers Earth to be only 10,000 years old. This differs from the second category, Scientific Creationism, which suggests that the biological processes of natural selection and mutation are not able to explain the changes undergone by all living beings<sup>14</sup>. According to Engler<sup>9</sup>, Scientific Creationism does not care as much about the value religion as they do about deny the existence of biological evolution. The creationism of Ancient Earth judges that the Earth was created more than 10,000 years ago, as conferred by geology. However, this category also subscribes to the idea that creation occurred supernaturally. The fourth category, Creationism of the Interval, considers the creation proposed

by Genesis 1, but asserts that there was a time interval between the origin of the Earth and the first day of creation, which refers to the appearance of light.

In "day-age", the fifth category, a literal interpretation of the bible is no longer present. In this category, it is believed that each day of creation presented by Genesis 1 refers to a geological or biological age<sup>14</sup>. The sixth group, special creationism, differs from scientific creationism and young earth in relation to the period of divine activity, that is, special creationists believe that species were created over time and not just in a short time. The category of intelligent plan or intelligent design was described by author Michael J. Behe of Darwin's black box. The author points out that the mechanism of random mutation is not sufficient to explain the perfection and complexity of the cells, and it is necessary for a designer to lead the evolutionary process<sup>15</sup>. The penultimate classification, anthropocentric creationism, accepts the theory of evolution and suggests that evolutionary processes progress according to the will and the management of God and that he is the creator of the soul of man.

The last category, called theistic evolutionism, seeks to reconcile evolutionary and creationist ideas. According to Milne and Bohlin<sup>16</sup>, theistic evolutionism suggests that God created the evolutionary process, but that he subsequently did not interfere in the alterations undergone by the beings involved. These authors also point out that theistic evolutionists believe that the evidence supporting evolution is so precise that there are no complications in conciliating the religiosity with the theory. Rodrigues and Motta<sup>17</sup> point out that theistic evolutionism includes God

in evolution only in more complex moments, as in the emergence of "*Homo sapiens*" and in macroevolutionary changes. Vieira<sup>18</sup> points out that this type of creationism excludes biblical literalism. It is worth emphasizing that atheistic evolutionism differs from theistic evolutionism. According to Nahor<sup>19</sup>, atheistic evolutionism can be translated simply as evolutionism, an evolutionary process that occurred without the participation of God.

According to Kojonen<sup>20</sup>, much has been written to show this compatibility of the Christian faith and the evolutionary theory as proposed by theistic evolutionism. This author further points out that, within theistic evolutionism, there is a wide range of views of how Darwinian evolutionary theory was directed, planned, or influenced and by whom. Barbour<sup>21</sup> presents three of these basic variations, the first view believes that God would control events that appear to be random. Therefore, evolution would be under God's control, but this oversight does not include the scientific theories that explain our origins. In the second view, God would have created a system of Law and Chance; in creating the universe He would have initiated a process that made evolution possible. And the third conception of theistic evolutionism would consider that God would influence evolutionary events, but without controlling them; therefore it would give the freedom for the world to evolve, however, he could influence evolution through his love, without controlling it.

Kojonen<sup>20</sup> also presents three conceptions of theistic evolutionism as a response to the problems posed by Darwinism to creationism. The first of these conceptions assumes that it is

possible to separate the scientific theory of biological evolution (compatible with Christianity) from the metaphysical vision of atheistic evolutionism, which would not have this compatibility. The second affirms that design and evolution are not opposites, since God has designed the process of evolution. Finally, the third justifies that it is not necessary to have scientific evidence to confirm the doctrine of creation since this belief does not operate at the same level of scientific theories, that is, religious doctrines are rooted in different worldviews than those of scientific theories. This author shows that severe criticisms of this type of evolutionary approach have been made by the supporters of the Intelligent Design hypothesis; they argue that theists would be adhering to many assumptions of atheistic evolutionists.

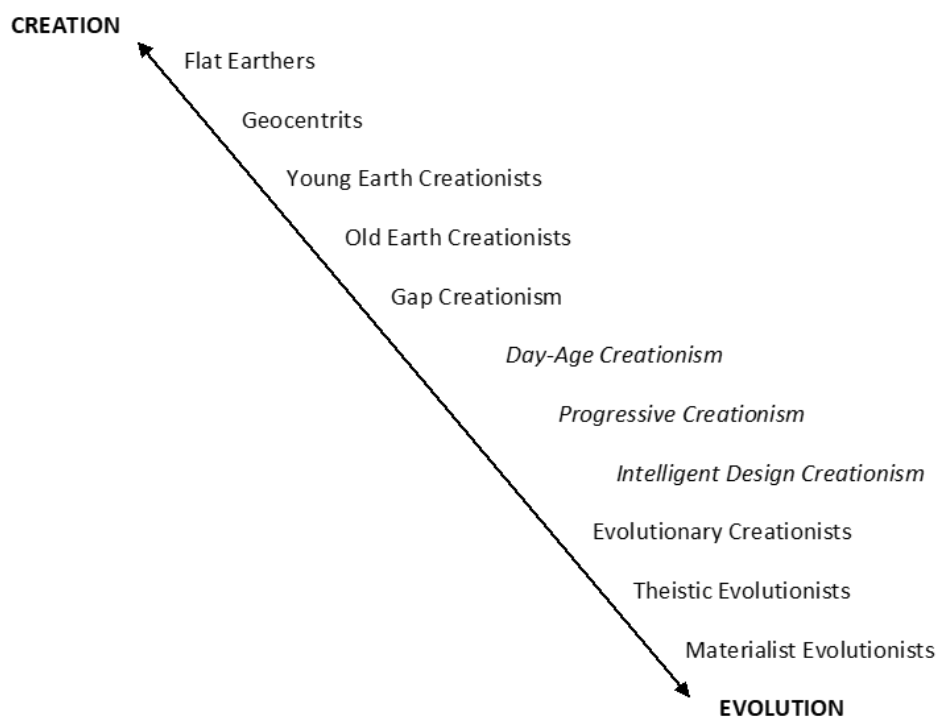
Scott<sup>12</sup> describes a continuum between creationism and Darwinian evolution. Theistic Evolutionism (ET) would be between Creationist Evolutionism (EC) and Evolutionary Materialism (ME) or Atheist Evolutionism. Creationist evolutionism, despite its name, is seen as a kind of evolution. In this line of thought, the Creator uses evolution to constitute the universe according to his plan. From a scientific point of view, it is difficult to differentiate it from Theistic Evolutionism, which also emphasizes continuity. The differences between ET and EC are not well described by science, but by theology, with EC being more in line with more conservative Christians, like some evangelical groups. Theistic Evolutionism would be a theological view that God created everything through evolution. The adherents of this perception accept all evolutionary, astronomical, geological and biological assumptions, and there is a great variety

in the role of the Creator. Some place Him only as the beginning and others consider Him as the one who intervenes in the most critical moments in the history of life, as in the origin of man.

This conception (ET) adopted by some Protestant groups and officially by the Catholic Church. Pope John Paul II<sup>22</sup> reiterated the alignment of Catholics with this conception, according to which evolution took place to God's creation; man would be descendent of primitive forms, but the hand of the Creator provided the human soul. After ET, the continuum proposed by Scott<sup>12</sup> highlights Evolutionary Materialism (ME), a non-religious view. The term

materialism can have two meanings, one scientific, which can be defined by the focus on matter and energy and their interactions. Modern science operates by the rules of materialistic methodology that would limit itself to explaining the natural world, using its material and energetic causes. It is neutral in relation to religion (neither pro nor against it) because supernatural forces are excluded from what it regards as causes of phenomena. Natural laws are all that exists, and the supernatural does not exist. Materialist (scientific or naturalistic) philosophy =defines the practical rules of how to do science. The following illustration, proposed by Scott<sup>12</sup>, presents this gradation more broadly.

**The Creation/Evolution Continuum**



Source: Scott (1999).

Theistic Evolutionism is accepted mainly by scientists who belong to a religion<sup>23</sup>. Rodrigues and Clementinho<sup>24</sup> cite that some divinity scholars (theologians)

believe that God gives nature freedom to create species. It is noted that Theistic Evolutionism is the category related to the religious field that most closely

approximates the Darwinian theory. For Miller et al.<sup>25</sup>, Accepted by conventional Catholics and Protestants, Theistic evolutionism treats evolution as how God created humans and other organisms. However, this conception is too complicated for a more literal Christian, for it implies a disturbance of the biblical account. Ayala<sup>26</sup>, a renowned scientist considered by many as an example of a theistic evolutionist, posits that the theory of evolution is asset for religion because it fills gaps in the religious conception, such as the explanation of evil in nature and of suffering, which can be justified by the action of natural selection without preventing one from believing in one Creator at the beginning of everything.

Such complexities warrant examination and analysis of members of the populace view and reconcile their personal beliefs with the conception of Theist Evolutionism. Such endeavor is critical to determine if and to what extent religious beliefs bias understanding of the evolutionary theory in a country marked by the intense religiosity.

## 2. Materials and Methods

The structured questionnaire applied in this study contained a total of twelve questions, divided into two main sections. The first section included demographic questions, such as gender, religious affiliation, and level of education, which were categorized as described below. The second section focused on scientific and religious beliefs regarding evolution, including a key question translated from the British 'Rescuing Darwin' questionnaire. This question specifically assessed participants' agreement with theistic

evolution, defined as the belief that God initiated evolution but did not interfere in subsequent biological changes. The response scale consisted of five options: 'Certainly true,' 'Probably true,' 'Probably false,' 'Certainly false,' and 'Do not know'.

This quantitative study used a questionnaire with twelve questions as a data collection tool (TABLE 1). The first four questions were translated into Portuguese from a British questionnaire titled *Rescuing Darwin*<sup>27</sup>, in a report in the most widely circulated newspaper in Brazil it was questioned that the result would be completely different in Brazil, due to a possible little affinity of the Brazilian people with creationism, something questionable, which motivated the verification in the field<sup>28</sup>. The remaining eight questions were formulated by the Portuguese-speaking researchers involved in this investigation. These additional questions were elaborated to address themes related to the teaching of the theme of Darwinian evolution and creationism, something not investigated in the original questionnaire, pertinent to the Brazilian universe.

*Instrument development and validation.* *Content validity* was established by a panel of three experts in science education and science-and-religion studies, who reviewed items for clarity, relevance, and cultural appropriateness. A *cognitive pretest* (n=20) assessed comprehension and response processes; minor wording adjustments followed. Internal consistency for the belief subscale (items on evolution/religion) was acceptable (Cronbach's  $\alpha=0.74$ ). The key TE item was translated and back translated from the *Rescuing Darwin* questionnaire to ensure semantic equivalence.

The response options available to interviewees resembled a Likert Scale in the sense that it sought to measure the level of respondent agreement or disagreement with questionnaire statements. It therefore excluded simplistic responses, such as YES or NO, and AGREE or DISAGREE. Instead, five response options were provided, as follows:

- a) Certainly true
- b) Probably true
- c) Probably false
- d) Certainly false

e) Do not know

*Sampling and procedures.* We used a **convenience sample** (N=390) from Formiga, Itaúna, and nearby municipalities (Minas Gerais). Trained undergraduate interviewers administered the instrument in public venues following a standardized script. Participation was voluntary and anonymous. To **mitigate interviewer and social-desirability bias**, we: (i) standardized prompts; (ii) positioned neutral ordering of response options; and (iii) avoided religious or scientific cues in recruitment.

TABLE 1- Percentage of respondents in relation to religion and education.

		Sample	
		Number of respondents	Percentage (%)
SEX	Female	244	62,6
	Male	146	37,4
RELIGION	Catholics	300	76,9
	Evangelicals	23	5,9
	Spiritualists	20	5,1
	Atheists	8	2,1
	Religion unstated	28	7,2
	Other religions	11	2,8
EDUCATION	Primary education	5	1,6
	Elementary education	40	10,2
	High school education	107	27,4
	Higher Education, no degree	106	27,2
	Higher Education, with degree	132	33,7
Total		390	100

Our regional sample also differed from the general Brazilian population with respect to their attained level of education. The sample included a higher percentage of people who completed a tertiary education (Higher Education, including college or university): 33.7% compared with just 7.9% in the general Brazilian population (CENSO 2010). Again, we recognize that the sample does not comprise an exact percentage representation of Brazilian education, but we consider that it does not exclude the possibility of discussing how years at school can interfere in the perception of issues related to the theme of Darwinian biological evolution.

In this study, we analyzed the question of number two (02), "*The theistic evolutionism, the idea that evolution is the means that God used for the creation of all living things on earth.*" which was translated from the English questionnaire. This question was designed to assess the extent to which the sample studied agreed with the idea that evolution was created by God, without any subsequent interference.

*Measures.* The primary outcome was agreement with theistic evolution ("God initiated evolution but did not subsequently intervene"), on a five-point scale (certainly true → certainly false; plus "don't know"). Predictors were religious

affiliation and education level (five categories).

*Analysis and limitations.* We used chi-square tests for independence ( $\alpha=0.05$ ). Given the ordinal nature of responses, we also ran a linear-by-linear association test as sensitivity analysis. Effect sizes are reported as Cramer's V. Limitations include non-probability sampling and reliance on a single-item TE measure. The chi-square test ( $\chi^2$ ) was used, with a significance level of  $p = 0.05$  defined *a priori*, as the criterion of statistical significance of results, thus, it is intended to verify if there is a statistically significant influence of the religion and the level of education of the interviewees.

### 3. Results

Overall, **68%** agreed that God initiated evolution (TE), **28%** disagreed, and **4%** responded "don't know". This result has some similarity to the original research carried out in the United Kingdom<sup>27</sup>. Like Brazilians, the British's views, for the most part, were based on religious explanations. They held atheistic evolutionist views of biological evolution, thus being slightly different from what is proposed by Darwinian theory, that is, evolution without the participation of a God.

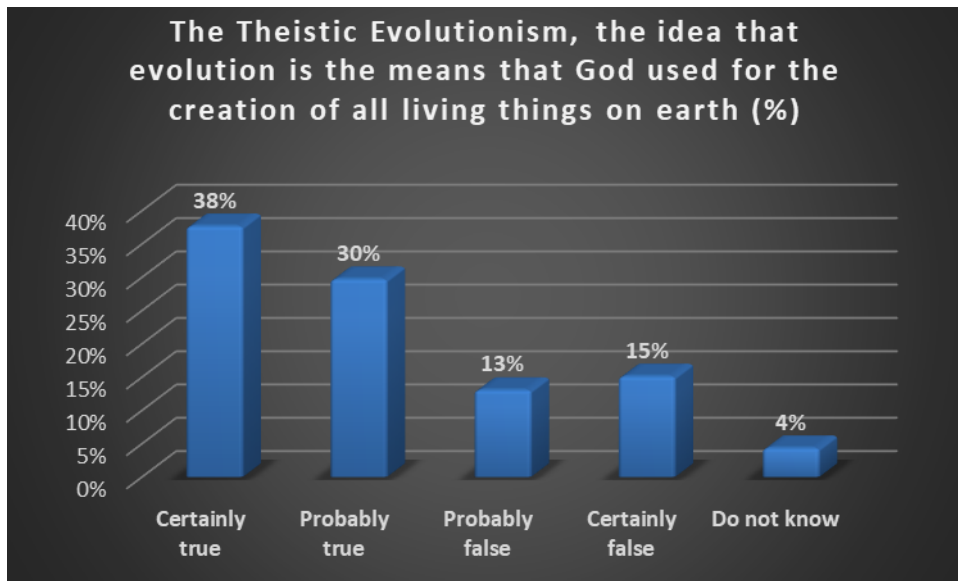


Figure 1- Percentages of respondent agreement and disagreement with theistic evolution.

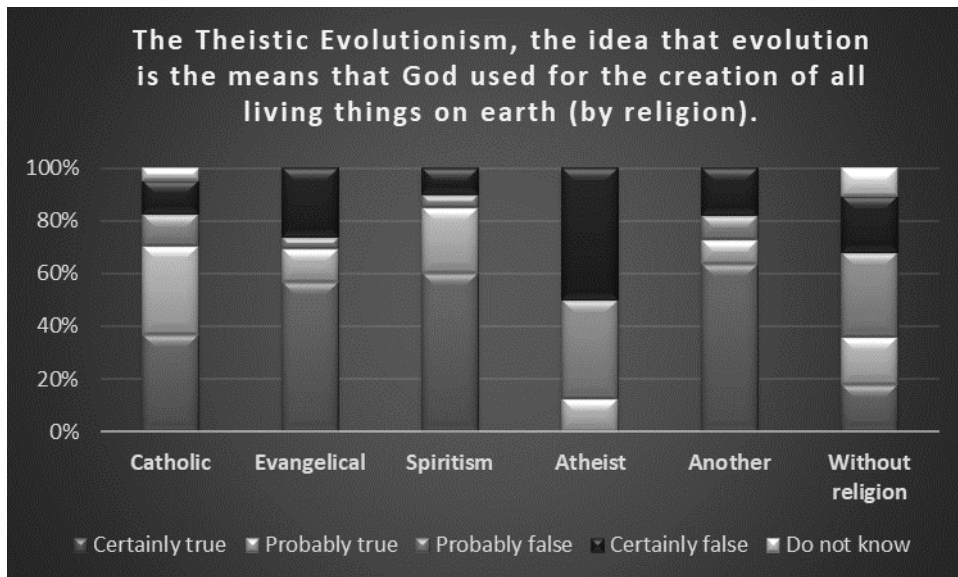
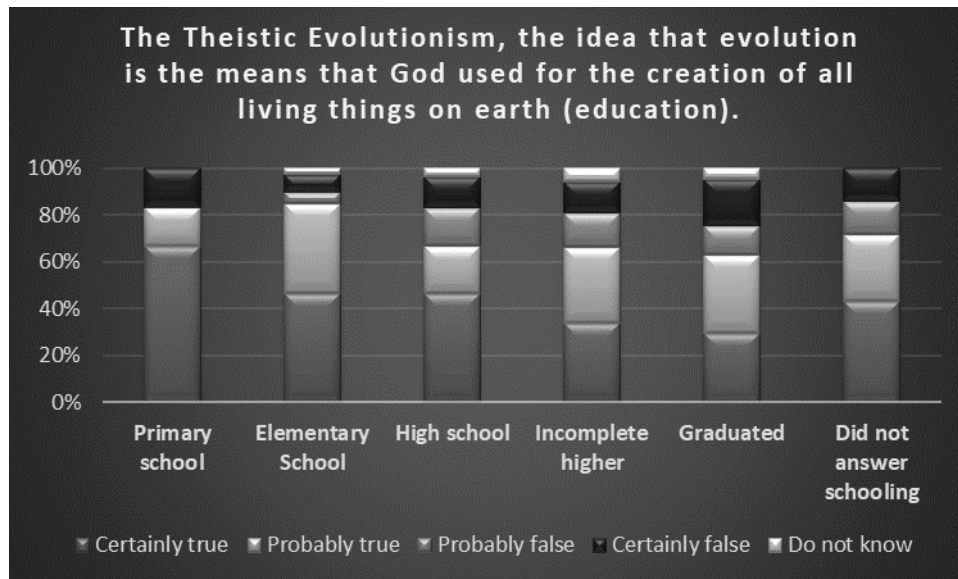


Figure 2 - Respondents' views grouped by religious affiliation.

Figure 2 illustrates the distribution of responses by religious affiliation ( $\chi^2(\dots) = 15.67, p < 0.05$ , Cramer's

$V = 0.20$ ). Catholics and Spiritists showed higher agreement; Evangelicals agreed less often; atheists largely disagreed



**Figure 3** - Respondents' views groups by level of schooling.

Figure 3 presents the distribution of responses according to education level. Although there was a visible trend in which respondents with higher education exhibited greater disagreement with theistic evolution. Agreement with TE showed a downward trend with higher education, but the association was not statistically significant ( $\chi^2(\dots)=12.34$ ,  $p=0.08$ , Cramer's  $V=0.14$ ; linear-by-linear association:  $p=0.07$ ).

The regional sample differed from the general Brazilian population with respect to religious affiliation. The sample included a higher percentage of Catholics and Spiritualists than currently found in Brazil, and a lower percentage of Evangelicals and those identifying as atheists or without religion. According to the Brazilian research institute Datafolha (2016), 50% of Brazilians are Catholics, 29% are Evangelicals, 2% are Spiritualists, and 14% define themselves as non-religious. Similarly, the sample included a higher proportion of individuals with higher education degrees (33.7%) compared to the national average (7.9%, according to the 2010 Census). While this

difference should be considered when interpreting the results, it does not invalidate the analysis of how religious affiliation and education levels influence perspectives on theistic evolution.

Although a trend was observed in which respondents with higher education exhibited greater disagreement with theistic evolution, statistical analysis did not confirm this difference as significant. This indicates that while schooling may contribute to shaping perspectives, religious affiliation appears to be the stronger determinant of attitudes toward theistic evolution.

#### 4. Discussion

Our data confirm Colombo's proposition<sup>28</sup> that there is greater acceptance of the evolutionary theory among Brazilians since those who believe in Theistic Evolutionism share the main presuppositions of the Darwinian theory. However, the reality of religious influence in Brazilian politics and education can be said to contradict Colombo<sup>28</sup> since, in recent years,

attempts have been made to hamper the teaching of evolution and raise the status of creationism due to a non-scientific Brazilian educational climate<sup>29</sup>. It is not possible to directly infer that the acceptance of evolution would imply support for its teaching, but it is assumed that there should be a correlation between the value given to the theme and its importance in the educational context.

Our findings suggest religiosity, more than formal schooling, structures priors about evolution. One mechanism is motivated reasoning: religious commitments provide identity-consistent frames through which evolutionary claims are appraised. The non-significant schooling effect hints that mere exposure to more years of education may be insufficient unless instruction explicitly addresses conflicts perceived between scientific explanations and faith.

An example of this climate occurred in 2014, when Pastor Marcos Feliciano, representative of one of the growing segments of neo-Pentecostal evangelicals<sup>30</sup>, proposed a law (PL8099/2014) suggesting the implementation of creationist education in all Brazilian schools, public and private. A second example comes from 2016, when another bill was prepared by Representative Jefferson Campos, who proposed the insertion of "Theory of Creation" in the basic and secondary school curriculum (PL 5336/2016).

Another recent event confirming the influence of the creationist movement in Brazil was reported by the Folha de São Paulo newspaper. A renowned Brazilian university created the "nucleus of science, faith and society", which aims to

carry out research related to Intelligent Design as a means of proving it to the scientific community. This university formed a partnership with the Discovery Institute in the USA, one of the main institutions responsible for publicizing the creationist hypothesis and the Intelligent Design<sup>31</sup>. It is also important to note that the opening of this institute of confessional nature was widely publicized in the Brazilian media, occupying prominence in the open television and in the internet with hardly any reaction from the Brazilian Scientific Societies. In addition, a letter of exaltation to Intelligent Design was published, at the invitation of the editor, in a Brazilian scientific journal seeking to disqualify Darwinian evolutionary theory<sup>32</sup>.

Meanwhile, in the United States, the respected scientific journal PLOs ONE has been severely criticized in the scientific field for having published an article that suggested, albeit subtly, that the human hand seemed to have been the Creator's work<sup>33</sup>. The reaction from the academic community was so strong that the scientific journal announced its retraction of the article and its authors apologized for their misuse of creationist terms; the article now appears in the magazine with all its pages containing information about the erratum<sup>34</sup>.

Our data shows that there is, among Brazilians, a great acceptance of evolutionist theory, albeit in a theistic way. Such adherence to Darwinism can possibly be used to avoid what happened in Turkey recently, which prohibited the teaching of biological evolution, causing countless losses to the science of that country<sup>35,36</sup>. The same happened in South Korea, although in that country the withdrawal of the theme of the biological evolution of High

School was abrogated quickly, given the reaction of the academic field of that country<sup>37</sup>. Again, it is not possible to be sure that not supporting the teaching of evolution implies non-acceptance of evolutionary theory. But it is assumed that if this theory is well accepted and valued, its teaching will be increased at all levels.

An inverse result to that found in this study was reported by Silva et al.<sup>38</sup>, which showed a high percentage of respondents who rejected the theory when presented in an atheistic way. For a high percentage of Brazilians, the acceptance of evolutionary theory was conditioned to some divine participation, moving away from the concept of materialistic evolutionism elaborated by Scott<sup>39</sup>. Therefore, this apparent contradiction may open an interesting space for the teaching of biological evolution, since, as long as the Darwinian scientific question is not placed in opposition to religious belief, there seems to be no problem with the subject for most Brazilians. In a study developed by Oliveira and Bizzo<sup>40</sup>, it was noticed that Brazilian students, of the various religious creeds, tended to have a high acceptance percentage in relation to the biological evolution in relation to topics such as the fossil record, ancestry species and natural selection.

Regarding the religion variable, FIG. 2, it was noticed that the acceptance of the statement was more prevalent among the religious. The percentage of agreement was higher among Spiritists and lower among Catholics. Colombo<sup>28</sup> points out that supporters of the Spiritist religion tend to accept Darwinian evolution more easily than other religions. The spiritists were also the group with the lowest percentage of

individuals in the sample, who did not know how to respond or rejected the proposition of atheistic evolutionism. This religious group tends to accept Theistic Evolutionism at the expense of atheistic Darwinian evolution.

Most Catholics also agreed with the statement. It is difficult to state the reason, but two hypotheses can be made. The first concerns a more traditional alignment of the Catholic Church with science. Engler<sup>9</sup> cites that the Catholic Church, through Pope Pius X, began to accept scientific theories as of 1909. In 2014, Pope Francis, in an interview, stated that the Theory of Biological Evolution like the Big Bang, is valid real and even criticized the perception of people who interpret the Genesis biblical book literally, thinking that God "acted like a magician, with a magic wand capable of creating all things". Therefore, Theistic Evolutionism tends to be the most accepted typology among Catholics. The opinion of some priests regarding evolution is one of acceptance, since they understand that this theory confirms their truthfulness<sup>23</sup>. Another hypothesis concerns a relatively recent growth of a more conservative type of Catholicism in Brazil and Latin America, namely charismatic Catholics, who tend to be more refractory to controversial themes in relation to religion<sup>41</sup>.

The percentage of evangelicals who opted for the "certainly true" alternative was relatively higher. This indicates that this group tends more frequently to insert a divine figure when explaining the creation of the world and in the evolution of species. However, it must be noted that when the answers "Certainly true" and "Probably true", the results are the same among those adherents of the

main Brazilian religions. Silva and Mortimer<sup>29</sup> have pointed out that there is a strong tendency among all religious groups to agree with Intelligent Design and Young Earth Creationism, two lines of thought that totally reject the premises of evolutionary theory. Therefore, the positive response to theistic evolutionism shows that there may be an understanding and acceptance of Darwinian assumptions even among those with strong religious beliefs. This trend is interesting when taking into account a marked increase in the number of evangelicals in Brazil. The difference of acceptance of evolutionary theory between evangelicals and Catholics revealed the former as more vehemently rejecting this conception, which Madeira's<sup>42</sup> finding that Catholics are more refractory to evolutionary concepts than evangelicals.

According to the graph of the variable schooling, FIG.3, there was a decline in the percentage of respondents who agreed with the question as school levels increased. That is, respondents with low schooling tended to accept theistic evolutionism more frequently than those with higher education. This result can be related to the acquisition of students' knowledge about evolutionary theory, which occurs from high school<sup>43</sup>, but in this research it was not possible to ascertain this. By understanding the assumptions related to biological evolution, such as mutation and natural selection, students tended to deny any divine act that is related to these processes. Thus, through the consolidation of the understanding of theory, over time, individuals tended to be compatible with Darwinian theory (accepted by science). However, a counterargument must be made in this

discussion. It would be necessary to investigate whether those with higher education are rejecting this line of thought by aligning themselves with atheistic Darwinism or by adhering to a more conservative view, since, as perceived by Silva et al<sup>43</sup>, there is a great rejection of the Darwinian theory when conceived in an atheistic way, among Brazilians.

Another possible explanation for this difference of acceptance of Theist Evolutionism in relation to schooling would be that some science teachers in Brazil have difficulty accepting Darwinian theory<sup>17</sup>. For these teachers, the best option was to embrace theistic evolutionism as a way of accommodating their religiosity to scientific theories. It would be necessary to investigate further how this teacher works the theme in the classroom. It can be re-conceived that theistic evolutionism can be an opportunity for teachers and students to reconcile the Darwinian evolution theme, as mentioned earlier. Oliveira and Bizzo<sup>40</sup> detected high levels of acceptance of this theory among religious students. Finding a pathway for evolutionary teaching among individuals of strong religiosity is imperative given that schooling has not proved to be significant for their acceptance. Souza et al<sup>44</sup> noticed that even among Biological Sciences students from a large Brazilian university, there is a great rejection among students of important biological evolution assumptions. Oliveira and Bizzo<sup>40</sup> detected that, even though it presents a favorable perception to this acceptance on Darwinian Evolutionary Theory among high school students, in relation to the theme Origin of Life and Man, the level of rejection is higher, making

compatibilization difficult.

Regarding the chi-square test ( $\chi^2$ ), it was observed that the religion variable was significant, but the same did not occur with schooling. The variable of religiosity proved to be significant only in relation to atheists in an obvious way contrary to the affirmation. Among all the major religious creeds, there was great acceptance of theistic evolutionism. With the educational variable, however, in spite of the small differences, a certain acceptance was found at all levels of education. Likewise, Silva et al.<sup>45</sup> found a strong rejection in this same sample when Darwinian thought was presented as a denial of God's participation in the evolutionary process. Therefore, it is reiterated that the teaching of this topic in Brazil must refrain from placing the scientific conception as opposed to religious in populations with strong beliefs.

Examples that illustrate, even educationally, the possibilities of compatibilization between biological evolution can be found in the history of biology itself. According to Fichman<sup>46</sup>, Wallace himself, co-author of the evolutionist theory with Darwin had a deep belief in the existence of God. Having been affiliated with the Spiritist doctrine did not diminishing his importance in the construction of the Theory of Evolution. Another striking example is that of Theodosius Dobzhansky, a well-known evolutionist of twentieth-century populations, and a fervent, therefore, theistic evolutionist, who coined the phrase that best represents the importance of evolution to biology: *"Nothing in biology makes sense except in the light of evolution."*<sup>47</sup> This same author added: *"Seen the light of evolution, biology is perhaps,*

*intellectually the most satisfying and inspiring science. Without that light, it becomes a pile of sundry facts—some of them interesting or curious but making no meaningful picture as a whole*<sup>47</sup>. The fact that this inspiring definition was elaborated by an iconic Darwinian scientist who was at the same time a theistic evolutionist shows that there is no incompatibility between understanding the role of evolution and a strong religious belief. And finally, the author describes how theist evolutionism constitutes a possible way of reconciling science and: *"Does the evolutionary doctrine clash with religious faith? It does not. It is a blunder to mistake the Holy Scriptures for elementary textbooks of astronomy, geology, biology, and anthropology. Only if symbols are construed to mean what they are not intended to mean can there arise imaginary, insoluble conflicts. As pointed out above, the blunder leads to blasphemy: the Creator is accused of systematic deceitfulness."* (Page 129)

The acceptance of theistic evolution among Brazilian respondents suggests a potential entry point for improving the teaching of evolution. Given that resistance to evolutionary theory is often tied to religious beliefs, an approach that acknowledges the compatibility between faith and science—while maintaining a rigorous scientific framework—could foster a more accepting attitude towards biological evolution in educational settings.

### **Implications for Education and Public Policy**

The results of this study have significant implications for education and public policy formulation. The high acceptance of theistic evolutionism among Brazilians

with lower levels of education suggests the need to strengthen science education in schools. Additionally, the differences observed among religious groups indicate that educational strategies should consider diverse religious traditions when addressing the topic of evolution.

Efforts to improve scientific literacy should include promoting a clear understanding of evolutionary theories and distinguishing between science and religion. This study highlights the importance of an educational approach that respects students' religious beliefs while simultaneously fostering a robust understanding of scientific theories.

### **Educational & social implications**

*Educational implications.* TE can function as a pedagogical bridge in religiously plural classrooms, enabling teachers to present core evolutionary concepts (common ancestry, natural selection, deep time) while acknowledging students' theological backgrounds. Evidence-informed strategies include: (i) epistemic boundary work, clarifying what science explains and what it does not claim about metaphysics; (ii) concept-first sequencing—leading with data (fossils, phylogenies, molecular homology) before theological discussions; and (iii) dialogic norms, framing respectful discourse that separates scientific models from personal beliefs.

*Social implications.* Broad acceptance of TE can lower cultural resistance to evolution education, supporting science-literacy policies and reducing polarization around curricula and teacher autonomy.

### **Study Limitations**

This non-probability sample limits external validity and may inflate TE prevalence. The key outcome relies on a single item, which, despite expert review and back-translation, may not capture multidimensional nuances of TE belief. Cross-sectional design precludes causal inference. Future studies should use multi-item scales, probabilistic sampling, and models (e.g., ordinal regression) that test interactions between religiosity and education.

### **5. Conclusions**

Our findings indicate that theistic evolution is widely accepted among religious respondents in our sample, while respondents with higher education levels showed greater skepticism. However, statistical analysis revealed that religious affiliation significantly influenced agreement with theistic evolution, while education level did not yield statistically significant differences. These results suggest that religious belief plays a more substantial role than formal education in shaping views on evolution. Given the regional scope of this study, further research with a more representative national sample is necessary to draw broader conclusions about the Brazilian population. *Curriculum guidelines* and *teacher-training programs* should incorporate modules on teaching evolution in religiously diverse contexts (epistemic limits of science, respectful dialogue, evidence-centered pedagogy). At the policy level, science-literacy initiatives can leverage TE's bridging potential without diluting scientific content, thereby improving public understanding of evolution.

## 6. Conflict of Interest

The author has no conflict of interest.

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